## REMARKS

The foregoing amendment amends Claims 1, 18 and 27 to correct certain inadvertent errors in the claims. Claims 1-29 are pending in the application. For the reasons set forth below, Applicants believe that the objections and rejections should be withdrawn and that the claims are in condition for allowance.

## OBJECTION TO SPECIFICATION

The Examiner objected to the Specification because of certain informalities. More specifically, the Examiner noted that paragraph [0073] contained a typographical error. Paragraph [0073] has been amended to delete the improper element reference and now recites that "the contacts a4 and c4 are connected in the switch 4." Accordingly, the objection to the Specification should be withdrawn.

## OBJECTION TO CLAIMS 1-17 AND 22-26

The Examiner objected to Claims 1-17 and 22-26 because of certain informalities. More specifically, the Examiner objected to Claim 1 for failing to recite a transitional phrase. Claim 1 has been amended to recite "said reactance adjuster comprising." Accordingly, the objection to Claim 1 should be withdrawn. Claims 2-17 and 22-26 depend from Claim 1. Accordingly, the objection to Claims 2-17 and 22-26 should be withdrawn.

## REJECTION OF CLAIM 18 UNDER 35 U.S.C. 112

The Examiner rejected Claim 18 under 35 U.S.C. 112, second paragraph for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. More specifically, the Examiner noted that there is insufficient antecedent basis for the limitation "said other end of said connection means." Claim 18 has been amended to properly recite "said other end of said first connection means." A first connection means is defined in Claim 18, and as such, there is proper antecedent basis for "said first connection means." Accordingly, the rejection of Claim 18 under 35 U.S.C. 112, second paragraph should be withdrawn.

**REJECTION OF CLAIM 18 UNDER 35 U.S.C. 102(b)**

The Examiner rejected Claim 18 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,137,375 to Li ("Li"). As discussed below, this rejection is respectfully traversed.

Claim 18 requires a second comparison means that compares an input voltage and *a second threshold voltage higher than said first threshold voltage* and outputs a signal to turn on said second connection means when said input voltage is higher than said second threshold voltage. As illustrated in Figure 6A, Li discloses an amplitude regulator 500 including a voltage difference detector 510 and a charge pump 520. The amplitude regulator 500 is placed in parallel with a current mode circuit 300 between an envelope detector 420 and a low-pass filter 440. The voltage difference detector 510 includes two comparators 514, 518 arranged to output "up" and "down" signals to the charge pump 520. The charge pump 520 includes DC current sources I3, I4 and CMOS switches S1, S2. The "up" or "down" signal is provided into the CMOS switch S1 or S2. The low-pass filter 440 consists of a capacitor $C_{INT}$ and is realized as an integrator.

In Li, if the output voltage $V_{ENV}$ from the envelope detector 420 is lower than the reference (threshold) voltage $V_{REF}$ ($V_{REF} > V_{ENV}$), the "up" signal is output from the comparator 514 to the charge pump 520, which causes the CMOS switch S1 to be closed. Thereby, the DC current source I3 charges the capacitor $C_{INT}$ to increase the voltage $V_{CON}$. This increases the negative conductance $-G_N$ of VCO 210, thus increasing the output voltage $V_{ENV}$. On the other hand, if the output voltage $V_{ENV}$ from the envelope detector 420 is higher than the reference (threshold) voltage $V_{REF}$ ($V_{REF} < V_{ENV}$), the "down" signal is output from comparator 518 to the charge pump 520, which causes the CMOS switch S2 to be closed. Thereby, the DC current source 14 releases the capacitor $C_{INT}$ to decrease the voltage $V_{CON}$. This decreases the negative conductance $-G_N$ of VCO 210, thus decreasing the output voltage $V_{ENV}$. *See*, Col.9, ll. 21-57 and Fig, 6A.

In the claimed invention, the reference voltages (the first and second threshold voltages) to be inputted into the two comparators (the first and second comparison means) have different values. When a voltage value is higher than the first threshold value and lower

than the second threshold value, both of the switches (the first and second connection means) are opened. This means that the voltage value of the claimed invention for opening both of the switches falls within the predetermined range.

In the claimed invention, because the reference voltages to be inputted into the two comparators have different values and both of the switches (the first and second connection means) are opened when a voltage value is higher than the first threshold value and lower than the second threshold value, the output switching section outputs the predetermined voltage having predetermined voltage from the constant voltage source to the integrator while either one of the first and second electric charge storing means is storing an electric charge. Since the predetermined voltage has a voltage value between the first and second threshold voltages (*see* [0088]), even if the voltage from the constant voltage source fluctuates due to noise or fluctuation, the claimed invention provides an advantage by preventing instability caused by the first connection means and/or the second connection means closing based on the noise or fluctuation.

In the claimed invention, the output switching section outputs the predetermined signal in accordance with the comparison result from the voltage comparator to the integrator when the first and second electric charge storing means stop storing an electric charge. When the amplitude of the electric field to be induced in the living body is maximized, the amplitude of the electric field corresponding to the reactance value at the time of outputting the high level signal is substantially equal to that corresponding to the reactance value at the time of outputting the low level signal (*see,* Figs. 2B and 3B), and thus the predetermined signal has a value around zero (target voltage value). Since the target voltage value has a voltage value between the first and second threshold voltages (*see* [0085]), even if the predetermined signal from the voltage comparator fluctuates around the target voltage value, the claimed invention provides an advantage by preventing the first and second connection means from being closed to flow a large current from the voltage source to a ground.

In contrast, Li discloses that the same reference value $V_{REF}$ is inputted into the two comparators 514, 518. Moreover, both of the switches S1, S2 are opened only when the voltage value $V_{ENV}$ is equal to the reference value $V_{REF}$. Thus, Li only considers one voltage

value for opening both of the switches S1, S2. Because Li teaches the use of only one voltage value (the reference value $V_{REF}$) for opening both of the switches S1, S2, Li cannot accomplish the above-described advantages. Li fails to disclose or suggest a second comparison means that compares an input voltage and a second threshold voltage higher than the first threshold voltage, as recited in Claim 18. Accordingly, the rejection of Claim 18 under 35 U.S.C. 102(b) should be withdrawn.

**REJECTION OF CLAIMS 1-3, 13-17 AND 22-29 UNDER 35 U.S.C. 103(a)**

The Examiner rejected Claims 1, 2, 13-17 and 22-29 under 35 U.S.C. 103(a) as being unpatentable over Fig. 1 of Applicants' Admitted Prior Art ("AAPA") in view of U.S. Publication No. 2002/0033729 to Lee *et al* ("Lee"). The Examiner rejected Claim 3 under U.S.C. 103(a) as being unpatentable over AAPA, in view of Lee and further in view of Li. As discussed below, these rejections are respectfully traversed.

Claim 1 requires a control section that "*outputs a voltage having a constant voltage value to said resonator section while either one of said first and said second electric charge storing means is storing an electric charge.*" Likewise, Claims 27-29 define methods that require "*outputting a voltage having a constant voltage value to said resonance portion when either one of said first electric charge storing means and said second electric charge storing means is storing electric charge.*"

In a conventional transceiver, in order to control a reactance value of a variable reactance provided between a modulation circuit and a transmitting-and-receiving electrode to maximize an electric field to be induced in a living body, a reactance adjusting operation is carried out. The reactance adjusting operation uses the relationship between the reactance value of the variable reactance and the amplitude of voltage to be applied to the living body which corresponds to the amplitude of the electric field, as shown in the convex upward graph in Figures 2B and 3B. An adjusting signal source alternately outputs to the variable reactance a high level signal (a signal for changing a current reactance value of the variable reactance into a reactance value higher than the current reactance value) and a low level signal (a signal for changing a current reactance value of the variable reactance into a

reactance value lower than the current reactance value). *See* Figures 2A and 3A.

In each cycle, a differential amplifier calculates the difference between the amplitude of the electric field induced in the living body while the adjusting signal source is outputting the high level signal to the variable reactance and the amplitude induced in the living body while the adjusting signal source is outputting the low level signal to the variable reactance. If the amplitude of the electric field at the time of outputting the high level signal is larger than that at the time of outputting the low level signal, a positive control signal is inputted from the differential amplifier to an integrator, thereby outputting a control signal for increasing the current reactance value from the integrator to the variable reactance. If the amplitude of the electric field at the time of outputting the low level signal is larger than that at the time of outputting the high level signal, a negative control signal is inputted from the differential amplifier to the integrator, thereby outputting a control signal for reducing the current reactance value from the integrator to the variable reactance. The reactance adjusting operation is repeated until the difference between the amplitude at the time of outputting the high level signal and that at the time of outputting the low level signal is equal to "0" (the amplitude at the time of outputting the high level signal is equal to that at the time of outputting the low level signal).

In a conventional transceiver, the positive/negative control signal is inputted to the integrator and the integrator outputs a control signal based on the positive/negative control signal to the variable reactance, while the amplitude of the electric field at the time of outputting the high/low level signal is being detected. In this situation, if the current reactance value is increased so that it is higher than the reactance value of the variable reactance at the time of outputting the high level signal according to the control signal output from the integrator, there is a possibility that the reactance value of the variable reactance at the next time of outputting the low level signal is higher than that of the previous time of outputting the high level signal in one cycle. Likewise, if the current reactance value is reduced so that it is lower than the reactance value of the variable reactance at the time of outputting the low level signal according to the control signal output from the integrator, there is a possibility that the reactance value of the variable reactance at the next time of

outputting the high level signal is lower than that of the previous time of outputting the low level signal in one cycle. This prevents normal reactance control from being properly carried out.

In order to overcome the above-described technical problem, the magnitude of change of the reactance value according to the control signal, depending on the difference between the amplitude of electric field at the time of outputting the high level signal and that at the time of outputting the low level signal in one cycle, may be set to be smaller than the magnitude of change of the current reactance value at the time of outputting the high and low level signals. However, limiting the magnitude of change of the current reactance value in this manner prolongs the time to control the reactance value of the variable reactance to maximize an electric field to be induced in the living body. *See*, [0005]-[0008], [0017]-[0018] and Figs.1-3B.

According to exemplary embodiments in the present invention, such as those illustrated in Figures 5, 14, 15, 17 and 18, in order to overcome the above-described technical problem, a reactance adjuster in a transceiver includes a capacitor C1 (a first electric charge storing means), a capacitor C2 (a second electric charge storing means), a variable reactance section 7 (a resonance section), a differential amplifier 10 (a voltage comparator), an adjusting signal source 13 (an adjusting signal generation section) and a control section 19, 20, 21, 23 or 230. The capacitor C1 stores an electric charge in accordance with an electric signal based on an electric field in a living body 121 (an electric field transmittable medium) while the adjusting signal source 13 outputs a high level signal to the variable reactance section 7. The capacitor C2 stores an electric charge in accordance with an electric signal based on an electric field in the living body 121 while the adjusting signal source 13 outputs a low level signal to the variable reactance section 7. The differential amplifier 10 compares a voltage across the capacitor C1 and a voltage across the capacitor C2 to output a voltage based on the difference between the voltages across the capacitors C1, C2 (a predetermined signal in accordance with the comparison result). *The control section 19, 20, 21, 23 or 230 outputs a zero voltage (a voltage having a constant voltage value) to the variable reactance section 7 while either one of the capacitors C1, C2*

*is storing an electric charge*, and inputs the voltage based on the difference between the voltages across the capacitors C1, C2 from the differential amplifier 10 to output a control signal (a voltage) based on the voltage to the variable reactance section 7 while the capacitors C1, C2 stop storing an electric charge. *See*, [0068]-[0075], and Figs. 5, 14, 15, 17 and 18.

Based on the above-described configuration, because the current reactance value of the variable reactance section 7 is unchanged during the detection of the amplitude of the electric field, the magnitude of change of the reactance value according to the control signal, depending on the difference between the amplitude of the electric field at the time of outputting the high level signal and that at the time of outputting the low level signal in one cycle, can be set independently from the magnitude of change of the current reactance value at the time of outputting the high and low level signals. Therefore, in comparison with a conventional transceiver, it is possible to shorten the time required to control a reactance value of the variable reactance to maximize an electric field to be induced in the living body.

The Examiner admitted that AAPA does not explicitly disclose a control section that outputs a voltage having a constant voltage value to said resonator section while either one of said first or second electric charge storing means is storing an electric charge, as required by Claims 1 and 27-29. However, the Examiner alleged that Lee describes a capacitor $C_{in}$ connected to one input of an amplifier and that the capacitor charges in a first time interval and applies the charged voltage to the amplifier in a second time interval. The Examiner alleged that it would have been obvious to modify the signal output section to include capacitors in order to "reproduce the captured signals with great precision to insure that the information of interest can be reliably obtained."

Lee merely discloses a capacitor $C_{in}$ connected to one input of an amplifier. *See* Fig. 2. Lee does not disclose or suggest a control section that *outputs a voltage having a constant voltage value to said resonator section while either one of said first and said second electric charge storing means is storing an electric charge*. Even if the references are combined, the combination does not describe the claimed control section and the combination fails to teach or suggest a method and/or configuration for overcoming the above-described technical

problem of conventional transceivers.

Accordingly, it would not have been obvious to one of ordinary skill in the art at the time of invention to modify the signal output section to include capacitors connected to the inputs of the voltage comparator for storing electric charges in accordance with said electric signal while said adjusting signal generation section outputs a high/low level signal to said resonator section, such that the voltage comparator and control section operate accordingly, as alleged by the Examiner. The assertion of obviousness is based on an improper application of hindsight.

Even if the references are combined, the combination does not describe the claimed invention since the combination does not describe a control section that outputs a voltage having a constant voltage value to the resonator section while either one of the first and second electric charge storing means is storing an electric charge.

In light of the foregoing, Claims 1 and 27-29 are patentable over AAPA in view of Lee and the rejection of Claims 1 and 27-29 under 35 U.S.C. 103(a) should be withdrawn. Claims 2, 13-17 and 22-26 depend from Claim 1, and for at least the same reasons discussed above, the rejection of Claims 2, 13-17 and 22-26 under 35 U.S.C. 103(a) should be withdrawn.

With regard to Claim 3, the Examiner rejected Claim 3 under U.S.C. 103(a) as being unpatentable over AAPA, in view of Lee and further in view of Li. Claim 3 depends from Claim 1 and Li also fails to disclose a control section that *outputs a voltage having a constant voltage value to said resonator section while either one of said first and said second electric charge storing means is storing an electric charge*. Accordingly, for at least the same reasons discussed above, Claim 3 is patentable over AAPA, Lee and Li.

Moreover, Claim 3 requires a second comparison means that compares an input voltage and *a second threshold voltage higher than said first threshold voltage* and outputs a signal for turning on said second connection means when said input voltage is higher than said second threshold voltage. Accordingly, as discussed above in detail with regard to Claim 18, Li does not disclose or suggest a second comparison means that compares an input voltage and a second threshold voltage higher than the first threshold voltage and cannot

achieve the advantages of the claimed invention. Accordingly, the rejection of Claim 3 under 35 U.S.C. 103(a) should be withdrawn.

**<u>REJECTION OF CLAIMS 1-17 AND 22-29 BASED ON NONSTATUTORY OBVIOUSNESS-TYPE DOUBLE PATENTING</u>**

The Examiner rejected Claims 1-17 and 22-29 on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over Claims 1-3 and 36 of U.S. Patent No. 7,069,062 to Minotani ("Minotani") in view of Lee. As discussed below, this rejection is respectfully traversed.

The Examiner admitted that Minotani does not explicitly disclose a control section that outputs a voltage having a constant voltage value to said resonator section while either one of said first and said second electric charge storing means is storing an electric charge, as required by Claims 1 and 27-29. However, the Examiner alleged that Lee describes a capacitor $C_{in}$ connected to one input of an amplifier and that the capacitor charges in a first time interval and applies the charged voltage to the amplifier in a second time interval. The Examiner alleged that it would have been obvious to modify the signal output section to include capacitors in order to "reproduce the captured signals with great precision to insure that the information of interest can be reliably obtained."

As discussed above, Lee merely discloses a capacitor $C_{in}$ connected to one input of an amplifier. Lee does not disclose or suggest a control section that *outputs a voltage having a constant voltage value to said resonator section while either one of said first and said second electric charge storing means is storing an electric charge*. Lee fails to teach or suggest a method and/or configuration for overcoming the above-described technical problem of conventional transceivers. Accordingly, it would not have been obvious to one of ordinary skill in the art at the time of invention to modify the signal output section to combine the references, as alleged by the Examiner. Even if the references are combined, the combination does not describe the claimed invention since the combination does not describe the claimed control section that outputs a voltage having a constant voltage value to the resonator section while either one of the first and said second electric charge storing means is

storing an electric charge. The rejection of Claims 1 and 27-29 on the grounds of nonstatutory obviousness-type double patenting should be withdrawn. Claims 2-17 and 22-26 depend from Claim 1, and for at least the same reasons discussed above, the rejection of Claims 2-17 and 22-26 on the grounds of nonstatutory obviousness-type double patenting should be withdrawn.

## ALLOWABLE SUBJECT MATTER

The Examiner indicated that Claims 4-12 and 19-21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 4-12 depend from Claim 1 and Claims 19-21 depend from Claim 18, and as discussed above in detail, Claims 1 and 18 are patentable over the cited references. Accordingly, Claims 4-12 and 19-21 have not been rewritten in independent form, and for at least the same reasons discussed above, Applicants respectfully submit that Claims 4-12 and 19-21 are patentable over the cited references.

## **CONCLUSION**

The foregoing is submitted as a complete response to the Office Action identified above. No fees are believed due. The Commissioner is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account 11-0855. If there are any issues that can be addressed via telephone, the Examiner is asked to contact the undersigned at 404.532.6946.

Respectfully submitted,

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